

Atty. Dkt. No. 074022-3302

Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently amended) An optical assay device for the detection of an analyte of interest in a fluid sample comprising:

a support containing channels;

an optically functional layer containing channels, said functional layer having an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, positioned on said support;

an attachment layer containing channels positioned on said optically functional layer;

and

an analyte specific receptive layer containing channels positioned on said attachment layer,

~~wherein said support, optically functional layer, attachment layer, and analyte specific receptive layer are configured and arranged (i) to provide channels that are continuous through each of said layers of said support, and (ii) to provide laminar flow of sample through said channels of said device from the surface of said device towards said support when a fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow from the analyte specific receptive layer to the support.

2. (Currently amended) An optical assay device for the detection of an analyte of interest in a fluid sample comprising:

a support containing channels;

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an optically functional layer containing channels, said functional layer having an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, positioned on said support; and

an attachment layer containing channels positioned on said optically functional layer to provide nonspecific capture of said analyte,

~~wherein said support, optically functional layer, and attachment layer are configured and arranged (i) to provide channels that are continuous through each of said layers of said support, and (ii) to provide laminar flow of sample through said channels of said device from the surface of said device towards said support when said fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow from the attachment layer to the support.

3. (Currently Amended) An optical assay device for the detection of an analyte of interest in a fluid sample comprising:

a porous support;

an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, comprising discrete, optically functional particles embedded in said support configured and arranged to provide channels through said optically functional layer;

an attachment layer containing channels positioned on said particles; and

an analyte specific receptive layer containing channels positioned on said attachment layer,

~~wherein said attachment layer and analyte specific receptive layer are configured and arranged (i) to provide channels through each of said layers that are continuous with said channels in said optically functional layer, and (ii) to provide laminar flow of sample through said channels of said device from the surface of said device towards said support when said fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow from said analyte specific receptive layer to said attachment layer and to said optically functional layer wherein fluid enters pores of said porous support.

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4. (Currently amended) An optical assay device for the detection of an analyte of interest in a sample comprising:

a porous support;

an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, comprising discrete, optically functional particles embedded in said support configured and arranged to provide channels through said optically functional layer; and

an attachment layer containing channels positioned on said particles to provide nonspecific capture of said analyte,

~~wherein said attachment layer is configured and arranged (i) to provide channels through said attachment layer that are continuous with said channels in said optically functional layer, and (ii) to provide laminar flow of sample through said channels of said device from the surface of said device towards said support when said fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow from the attachment layer to said optically functional layer wherein fluid enters pores of said porous support.

5. (Currently amended) An optical assay device for the detection of an analyte of interest in a sample comprising:

a porous support;

an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, containing channels positioned on said support;

an attachment layer containing channels positioned on said optically functional layer;

and

an analyte specific receptive layer containing channels positioned on said attachment layer,

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wherein ~~said attachment layer and analyte specific receptive layer are configured and arranged (i) to provide channels that are continuous through each of said layers of said support, and (ii) to provide laminar flow of sample through said channels of said device from the surface of said device towards said support when said fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow from said analyte specific receptive layer to said attachment layer and to said optically functional layer wherein fluid enters pores of said porous support.

6. (Currently amended) An optical assay device for the detection of an analyte of interest in a sample comprising:

a porous support;

an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, containing channels positioned on said support; and

an attachment layer containing channels positioned on said optically functional layer to provide nonspecific capture of said analyte,

wherein ~~said attachment layer is configured and arranged (i) to provide channels that are continuous through each of said layers of said support, and (ii) to provide laminar flow of sample through said channels of said device from the surface of said device towards said support when said fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow from said attachment layer to said optically functional layer wherein fluid enters pores of said porous support.

7. (Original) The device of any of claims 1, 2, 3, 4, 5 or 6 wherein said optically functional layer further comprises an antireflective layer.

8. (Original) The device of any of claim 1, 2, 3, 4, 5 or 6, wherein said attachment layer is nickel.

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9. (Previously presented) The device of any of claim 1, 2, 3, 4, 5 or 6, wherein said device further comprises a liquid absorbent material surrounding said optically functional layer or beneath said support.

10. (Original) The device of any of claims 1, 2, 3, 4, 5 or 6, wherein said support comprises polyester or polycarbonate, said optically functional layer comprises a layer of silicon nitride positioned on a layer of amorphous silicon, and said attachment layer comprises nickel.

11. (Original) The device of any of claims 1, 2, 3, 4, 5 or 6 wherein said support comprises polycarbonate or polyester, and said optically functional layer comprises a layer of germanium on which is positioned a layer of diamond-like carbon.

12. (Original) The device of any of claims 1, 2, 3, 4, 5 or 6 wherein said optically functional layer comprises a layer of germanium on which is positioned a layer of diamond-like carbon, and said attachment layer comprises nickel.

Claims 13-17 (Cancelled)

18. (Currently amended) Method for constructing an optical assay device with laminar flow properties, comprising the steps of:

providing a support comprising channels;

providing an optically functional layer containing channels, said optically functional layer having an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, on said support;

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providing an attachment layer containing channels on said optically functional layer; and
providing an analyte specific receptive layer containing channels on said attachment
layer,

~~wherein said support, optically functional layer, attachment layer, and analyte specific
receptive layer are configured and arranged (i) to provide channels that are continuous through
each of said layers of said support, and (ii) to provide laminar flow of sample through said
channels of said device, from the surface of said device towards said support, or through said
channels of said device from the surface of said device towards said support and across one or
more of said layers of said device when said fluid sample is introduced into said device~~ said
channels are positioned to allow fluid flow from the analyte specific receptive layer to the
support.

19. (Currently amended) Method for constructing an optical assay device with laminar
flow properties, comprising the steps of:

providing a support comprising channels;

providing an optically functional layer containing channels, said optically functional
layer having an optical property of which is detectably altered upon a change in mass on said
optically functional layer related to analyte binding, on said support; and

providing an attachment layer containing channels on said optically functional layer to
provide nonspecific capture of said analyte,

~~wherein said support, optically functional layer, and attachment layer are configured and
arranged (i) to provide channels that are continuous through each of said layers of said support,
and (ii) to provide laminar flow of sample through said channels of said device from the surface
of said device towards said support or through said channels of said device from the surface of
said device towards said support and across one or more of said layers of said device when said
fluid sample is introduced into said device~~ said channels are positioned to allow fluid flow
from the attachment layer to the support.

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20-22. (cancelled)

23. (Currently amended) A composition comprising:

a support comprising channels or a porous support, and an optically functional layer containing channels positioned on said support, said optically functional layer having an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding;

~~wherein said optically functional layer is configured and arranged (i) to provide channels that are continuous through each of said layers of said support, and (ii) to provide laminar flow of sample through said channels of said optically functional layer from the surface of said device towards said support when a fluid sample is introduced onto said optically functional layer~~ said channels in said optically functional layer are positioned to allow fluid flow to the support either through channels in the support or via pores in the porous support.

24. (Cancelled)

25. (Currently amended) The composition of claim 23, wherein said support is porous and said channels in said optically functional layer are formed from comprises optically functional particles.

26. (Currently Amended) The composition of claim 23, wherein said support is porous ~~and said optically functional layer contains channels.~~

27. (Original) The composition of claim 23, wherein said support comprises polycarbonate and said optically functional layer comprises amorphous silicon.

28. (Original) The composition of claim 27, wherein said optically functional layer further comprises a layer of silicon nitride positioned on said amorphous silicon.

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29. (Original) The composition of claim 23, wherein said support comprises polycarbonate and said optically functional layer comprises germanium.

30. (Original) The composition of claim 29, wherein said optically functional layer further comprises a layer of diamond-like carbon positioned on said germanium.

31. (Original) The composition of claim 23, wherein said support comprises polyester and said optically functional layer comprises amorphous silicon.

32. (Original) The composition of claim 31, wherein said optically functional layer further comprises a layer of silicon nitride positioned on said amorphous silicon.

33. (Original) The composition of claim 23, wherein said support comprises polyester and said optically functional layer comprises germanium.

34. (Original) The composition of claim 33, wherein said optically functional layer further comprises a layer of diamond-like carbon positioned on said layer of germanium.

35. (Cancelled)

36. (Currently amended) The device of any of claims 1, 2, 3, 4, 5 or 6, 18, 19, 23 or 51-54 wherein said analyte is selected from the group consisting of antigens, antibodies, receptors, ligands, chelates, proteins, enzymes, nucleic acids, DNA, RNA, pesticides, and herbicides.

37. (Currently amended) The device of any of claims 1, 2, 3, 4, 5 or 6, 18, 19, 23 or 51-54 wherein said optically functional layer comprises a layer of silicon nitride positioned on a layer of amorphous silicon.

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38. (Currently amended) The device of any of claims 1, 2, 3, 4, 5 or ~~of 6~~, 18, 19, 23 or 51-54 wherein said attachment layer comprises diamond-like carbon.

39. (Currently amended) An assay device for the detection of an analyte of interest comprising:

a support,

an optically functional layer positioned on said support, and

an attachment layer positioned on said optically functional layer ~~support~~ to provide nonspecific capture of said analyte, said attachment layer comprising diamond-like carbon.

40. (Previously presented) An optical assay device for the detection of an analyte of interest comprising:

a support,

an optically functional layer positioned on said support;

an attachment layer positioned on said optically functional layer comprising diamond-like carbon, and

an analyte specific receptive layer positioned on said attachment layer.

41. (Currently amended) The device of claim 39 ~~or 40~~, further comprising an analyte specific receptive layer positioned on said attachment layer.

42. (Previously presented) The device of claim 39 or 40, wherein said attachment layer non-specifically binds analyte selected from the group consisting of antigens, antibodies, receptors, nucleic acids, polysaccharides, lipopolysaccharides, enzymes, proteins, microorganisms, fragments derived from microorganisms, haptens, drugs, food contaminants, environmental agents, ligands, and chelators.

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43. (Currently amended) The device of claim 40 or 41, wherein said receptive layer comprises biomolecules selected from the group consisting of antigens, antibodies, receptors, nucleic acids, polysacchrides, lipopolysacchrides, enzymes, proteins, microorganisms, fragments derived from microorganisms, haptens, drugs, food contaminants, environmental agents, ligands, and chelators.

44. (Currently amended) The device of claim 39, wherein said diamond-like carbon is coated on said ~~support~~ optically functional layer to a thickness of 50 Å.

45. (Original) The device of claim 40, wherein said diamond-like carbon is coated on said optically functional layer to a thickness of 50 Å.

46. (Currently amended) The device of claim 39, wherein said diamond-like carbon is coated on said ~~support~~ optically functional layer to a thickness of 50 to 3000 Å.

47. (Original) The device of claim 40, wherein said diamond-like carbon is coated on said optically functional layer to a thickness of 50 to 3000 Å.

48. (Original) The device of claim 39, wherein said diamond-like carbon is coated on said support by a process selected from the group consisting of ion beam technique, chemical vapor deposition, plasma deposition, ion beam gun, shock-synthesis technique, sputtering, thermal radio-frequency and microwave-supported plasmas, heated filament, direct current plasma, chemical vapor deposition, and plasma deposition.

49. (Original) The device of claim 40, wherein said diamond-like carbon is coated on said optically functional layer by a process selected from the group consisting of ion beam technique, chemical vapor deposition, ion beam gun, shock-synthesis technique, sputtering,

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thermal radio-frequency and microwave-supported plasmas, heated filament, direct current plasma, chemical vapor deposition, and plasma deposition.

50. (Original) The device of claim 39 or 40, wherein said diamond-like carbon comprises industrial diamonds.

51. (New) Method for constructing an optical assay device with laminar flow properties, comprising the steps of:

providing a porous support;

providing an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, comprising discrete, optically functional particles embedded in said support configured and arranged to provide channels through said optically functional layer;

providing an attachment layer containing channels positioned on said particles; and

providing an analyte specific receptive layer containing channels positioned on said attachment layer,

wherein said channels are positioned to allow fluid flow from said analyte specific receptive layer to said attachment layer and to said optically functional layer wherein fluid enters pores of said porous support.

52. (New) Method for constructing an optical assay device with laminar flow properties, comprising the steps of:

providing a porous support;

providing an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, comprising discrete, optically functional particles embedded in said support configured and arranged to provide channels through said optically functional layer; and

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providing an attachment layer containing channels positioned on said particles to provide nonspecific capture of said analyte,

wherein said channels are positioned to allow fluid flow from the attachment layer to said optically functional layer wherein fluid enters pores of said porous support.

53. (New) Method for constructing an optical assay device with laminar flow properties, comprising the steps of:

providing a porous support;

providing an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, containing channels positioned on said support;

providing an attachment layer containing channels positioned on said optically functional layer; and

providing an analyte specific receptive layer containing channels positioned on said attachment layer,

wherein said channels are positioned to allow fluid flow from said analyte specific receptive layer to said attachment layer and to said optically functional layer wherein fluid enters pores of said porous support.

54. (New) Method for constructing an optical assay device with laminar flow properties, comprising the steps of:

providing a porous support;

providing an optically functional layer, an optical property of which is detectably altered upon a change in mass on said optically functional layer related to analyte binding, containing channels positioned on said support; and

providing an attachment layer containing channels positioned on said optically functional layer to provide nonspecific capture of said analyte,

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wherein said channels are positioned to allow fluid flow from said attachment layer to said optically functional layer wherein fluid enters pores of said porous support.

55. (New) The device of any of claims 2, 4, 6, 19, 39, 52 or 54 wherein said channels in said attachment layer do not exceed 15% of the surface area of the layer.

56. (New) The device of any of claims 2, 4, 6, 19, 39, 52 or 54 wherein said channels in said device are not interconnected.

57. (New) The device of any of claims 1, 3, 5, 18, 40, 51 or 53 wherein said channels in said analyte specific receptive layer do not exceed 15% of the surface area of the layer.

58. (New) The device of any of claims 1, 3, 5, 18, 40, 51 or 53 wherein said channels in said device are not interconnected.

59. (New) The device of claim 23 wherein said channels in said optically functional layer do not exceed 15% of the surface area of the layer.

60. (New) The device of claim 23 wherein said channels in said device are not interconnected.

61. (New) The device of any preceding claim wherein said channels are configured to provide laminar flow of sample across the layer which binds analyte of said support, said flow achieved by the movement of sample into channels that connect the layer which binds analyte to the support.

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